and Holborn, and the silence due to the absence of vehicles, all came to mind on reading Mr. Harding's letter. It took me on that occasion more than four hours to perform a journey of about two miles, and progression was only made possible by encasing my boots in the folds of a woollen scarf which I was wearing at the time, which I took off and cut into two portions for the purpose. There was no viaduct at that time, and Holborn Hill interposed serious difficulties.

The explanation of the phenomenon is no doubt that given in "The Observer's Handbook" quoted by Mr. Harding, viz. the sudden freezing of supercooled water drops on shock. In connection with this explanation there naturally arises the question as to the particular conditions which admit of supercooling without actual conversion into hail. Clearly these conditions are but rarely complied with. The actual date could no doubt be found by hunting through newspaper files, but there must be many Londoners now living who can remember the occasion.

January 26. R. Meldola.

The Radiating Power of Air.

It has been assumed in investigations of atmospheric radiation that the values of the radiating power obtained in laboratory experiments are comparable with the values obtained from meteorological observations, and agreement between values obtained by the two methods has been quoted as evidence of the accuracy of the determinations. In an investigation of the problem from the meteorological side, I discovered that the quantities used to represent the radiating power were different in the two cases, and the distinction is important.

In the meteorological method, if θ is the temperature of the air at time t during the night, values of α, θ_0 are found to satisfy approximately the equation

$$\frac{d\theta}{dt} = -\alpha(\theta-\theta_0) \quad . \; . \; . \; . \; . \; . \; . \; . \quad (1)$$

and $\alpha\rho c$ is taken to represent the radiating power of the air, where c is specific heat, 0·239, and ρ is density.

If the radiation from a horizontal layer of air 1 cm. thick is $f(\theta)$ per unit area from each face, the absorption by it will be $2f(\theta')$ per unit volume if its surroundings are at temperature θ'. In that case

$$\begin{aligned}\rho c\frac{d\theta}{dt} &= -2\,[f(\theta)-f(\theta')] \\ &= -2\,(\theta-\theta')\frac{\partial f}{\partial\theta} - \text{higher powers of } (\theta-\theta') \quad . \; . \quad (2)\end{aligned}$$

and by comparison with (1) it is seen that

$$\alpha\rho c = 2\frac{\partial f}{\partial\theta},\ \theta_0 = \theta'.$$

Now, in laboratory experiments on the radiation of air, the quantity measured is the excess of the radiation per unit area from one face of a column or layer of hot air over the corresponding radiation from a column or layer of cold air, and this quantity, reduced to 1° C. difference of temperature for a layer 1 cm. thick, is denoted by h, and is used to represent the radiating power. Clearly $h = \frac{\partial f}{\partial\theta}$ and *consequently* $\alpha\rho c = 2h$, *and not* h, *as hitherto assumed.* If in the laboratory experiments the radiation emitted by the layer in a direction perpendicular to its face is compared with that emitted normally by a black surface, the value of h will be only $\frac{1}{2}\frac{\partial f}{\partial\theta}$ or $\frac{1}{4}\alpha\rho c$, since the ratio of the total radiation to the normal radiation is π for the black surface but 2π for a thin layer of air.

The confusion arose from the fact that h and $\alpha\rho c$ were taken to represent the rate at which air is losing heat by radiation to surroundings 1° C. colder, but while in the case of $\alpha\rho c$ the radiation in all directions was taken into account implicitly, in the case of h the necessary adjustment was not made. E. Gold.

4 Hurst Close, Hampstead Garden Suburb, N.W.

Microscope Stands.

A lengthened experience in the use of the microscope impels me to ask you to allow me to take exception to one of the statements made by the writer of the article on microscope stands which appears in Nature of January 11. Referring to the circular rotating and centring stage of the better class of Continental stands, the writer says, "the use of which for anything but petrology it is difficult to guess."

After working for upwards of thirty years with an English stand, and, especially during the latter part of that time, constantly feeling the desirability of a rotating stage, I decided three years ago upon the purchase of a new stand, and the circular rotating stage was the feature that led me to decide upon one of Continental manufacture, after carefully considering the merits of two of English manufacture. If well made, the rotating stage is of great utility. If one wishes to examine, and especially to draw, say, one of a number of scattered Ophiurid or Echinoid plutei, it is a great convenience to be able to bring its sagittal plane into a vertical position in the field of view, and, as I know from much irritating experience, this is seldom possible on a fixed rectangular stage provided with mechanical adjustments, or even a sliding bar.

What is really needed to make the rotating stage of the Continental microscope much more efficient is a removable sliding bar, upon which it would be possible to support a 3×1½ inch slip, so that a series of sections mounted upon it might be examined carefully with the microscope in an inclined position. The rotating stage of a high-class stand by one of the foremost English makers, now before me, is provided with such a bar, which slides in a groove cut in the stage; but its utility for the purpose indicated above is nullified by the projecting heads of two screws which hold together parts of the mechanical adjustments, and the whole instrument is little more than an ornament on my work-table.

I have never found any use for the excentric rotating movement below the Abbe condenser, and especially for the cylinder diaphragm, which, I suppose, is a sop thrown by Continental makers to those teachers who, in my student days, derided the use of any form of substage illuminator. In my opinion the expense incurred in the manufacture of these redundances might with great advantage to workers like myself be devoted to the improvement of the stage on the lines I have indicated.

H. C. Chadwick.

The Biological Station, Port Erin, January 26.

Meteor-showers.

The following meteor-showers become due in February. The epochs are arranged according to the times of the principal maxima:—

Epoch February 4, 3h. 30m. (G.M.T.), fifth order of magnitude. Principal maximum, February 3, 8h. 55m.; secondary maxima, February 3, 3h. 40m. and 20h. 20m.

Epoch February 3, 9h. 30m., nineteenth order of magnitude. Principal maximum, February 4, 21h. 15m.; secondary maxima, February 4, 11h. 25m., and February 6, 6h. 50m.

Epoch February 9, 4h., twenty-first order of magnitude. Principal maximum, February 10, 8h. 40m.; secondary maxima, February 10, 1h. 30m., and February 11, 8h. 25m.

Epoch February 13, 11h., fifth order of magnitude. Principal maximum, February 12, 13h. 45m.; secondary maxima, February 11, 22h. 30m., and February 13, 10h. 45m.

Epoch February 14, 11h. 30m., thirty-third order of magnitude. Principal maximum, February 15, 22h. 45m.; secondary maxima, February 14, 11h. 35m., February 15, 15h. 30m., and February 16, 7h.

Epoch February 16, 8h., approximately tenth order of magnitude. Principal maximum, February 17, 0h. 30m.; secondary maximum, February 17, 15h. 40m.

Epoch February 19, 1h., approximately thirteenth order of magnitude. Principal maximum, February 18, 5h. 40m.; secondary maxima, February 18h., 3h. 40m., and February 18, 18h. 55m.

Epoch February 20, 7h., fifteenth order of magnitude.

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Principal maximum, February 20, 12h. 20m.; secondary maxima, February 20, 17h., February 22, 7h. 45m., and 16h. 30m.

Epoch February 26, 3h. 30m., approximately fourteenth order of magnitude. Principal maximum, February 24, 7h. 50m.; secondary maximum, February 24, 22h. 50m.

Epoch February 26, 14h., fourteenth order of magnitude. Principal maximum, February 25, 23h. 20m.; secondary maximum, February 24, 9h. 50m.

Epoch February 27, 23h., approximately sixth order of magnitude. Principal maximum, February 28, 6h.; secondary maximum, February 29, 9h.

Epoch February 27, 14h. 30m., third order of magnitude. Principal maximum, February 29, 6h. 30m.; secondary maxima, February 27, 23h., and February 28, 12h. 40m.

There is a considerable number of meteor-showers in February, but the meteoric activity of the month is, in general, not so intense as in January. The most important epochs in the foregoing list are the second and the last five.

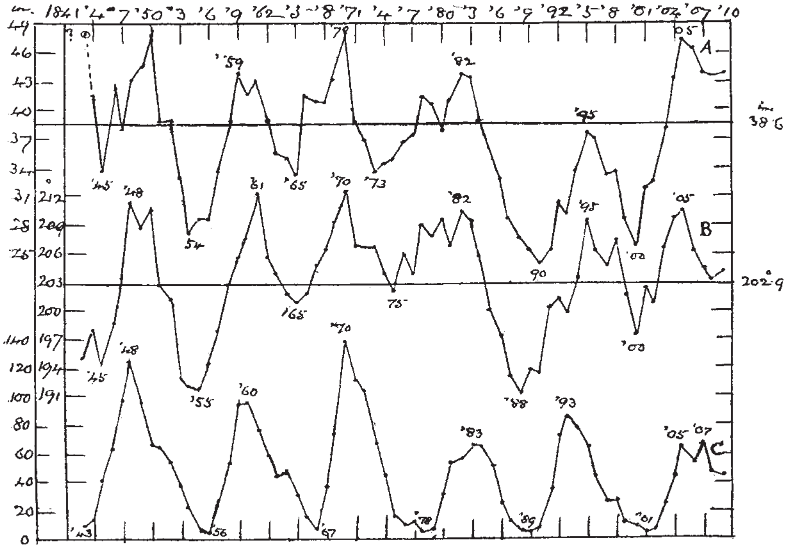
JOHN R. HENRY.

January 29.

The Question of Sun-spot Influence.

IN a paper to the *Meteorologische Zeitschrift* (September, 1911), Dr. Magelssen, dealing with sun-spot influence on temperature, finds this influence, at Christiania, &c., most apparent in the winter half of the year. This is borne out, I think, by the data for Greenwich.

We might approach the matter thus: Taking the six maxima and six minima since 1841, and confining attention to the groups "max. 1, 2" and "min. 1, 2," let us ask how many warm Januarys, Februarys, &c., there were in those years (eighteen in either case). The most pronounced contrast (between maximum and minimum groups) thus comes out in the early part of the year, and (localising further) in the pair February-March.



A. Rainfall, Rothesay, February–March; smoothed, with sums of 5.
B. Mean temp. Greenwich " " ,
C. Sun-spot curve. "

If, now, we take the annual values of mean temperature for February-March, and smooth the series by simple addition of the groups 1841–5, 1842–6, and so on, (this is sufficient), we get the curve B in the diagram.

Now, if we handle the monthly *data* of Rothesay rainfall in the same way, a maximum contrast comes out, similarly, in the early part of the year. Then, taking the annual amounts for February-March, and smoothing with sums of five, we have the curve A.

Below is the sun-spot curve, and it is remarkable, I think, to find things so far apart as Rothesay rainfall and Greenwich temperature in the February-March group presenting so much correspondence with each other and with the undulations of the sun-spot curve.

(The first point of the curve A I have marked as doubtful, for reasons I need not here enter into.)

ALEX. B. MACDOWALL.

The Occurrence of Peripatus on the North-East Frontier of India.

THE following extract from a letter just received from Mr. S. W. Kemp, zoologist with the Abor Expedition, will, I think, be of interest to the readers of NATURE, as it announces the first discovery of the Prototracheata in what may properly be called Continental Asia. The latter is dated Rotung, December 20, 1911:—

"Yesterday I toiled up to Kalek (3800 feet). . . . On my return Hodgart, Mr. Kemp's assistant, rushed up with Peripatus in a tin, caught about 20 yards from me—one adult and two young. . . . This morning we toiled for about four hours and got nine or ten more adults and a number of young. They occur over an area of about 30 square yards, and apparently nowhere else. The camp is made on an old Abor clearing. Prior to our occupation it was scrub jungle about 6 to 8 feet high, with a few large trees, mostly jack-fruit, interspersed. The scrub has been cut all round the camp, and on the north side, at the top of the steep bank dropping down to the Dihong River, Peripatus is found under large stones in comparatively dry earth."

Mr. Kemp has as yet no opportunity of examining his specimens in a systematic manner; it will be of great interest from a geographical point of view to discover their genus in a restricted sense.

N. ANNANDALE.

Indian Museum, Calcutta, January 11.

Amphibian Faunas of South Africa and Madagascar.

IN reference to the question raised by the reviewer (NATURE, December 14, 1911) of my paper on the amphibian faunas of South Africa and Madagascar (Annals Transvaal Museum, April, 1911), the distribution of the genus Rana suggests that it originated in the Old World some time subsequent to the isolation of Madagascar and the disruption of the Brazil-West African land bridge, its passage to the New World being effected by a more northern bridge, probably the Bering Straits connection. The other Ranid genera of central and tropical America are unknown to me, but, judging from the descriptions, they form quite an isolated group, and if genetically related to the Old World Ranidæ had their origin, not in the specialised genus Rana, but in a more primitive Ranid stock which entered the New World by the Brazil-West African bridge.

JOHN HEWITT.

Albany Museum, Grahamstown,
South Africa, January 4.

A Bright Fireball.

ON December 17, 1911, shortly after 5 p.m., while watching the dying glories of one of the loveliest sunsets I have ever seen, I saw a meteor fall in the west and burst into about twenty most brilliant balls, like an exploding rocket. I estimate that it appeared when about 20° above the horizon, and traversed perhaps 5° before bursting. It left a vertical and broad streak of white light on the sky, which very slowly became deflected from the perpendicular to the N.W., and when at about an angle of 45° it faded gradually into two patches of white cloud, which ultimately assumed a horizontal position. These retained their pale white colour until after the other clouds had become quite dark, and they did not disappear until they were obscured by some of these clouds passing over them. It was seen from Beni-Hassan on the Nile, 167 miles south of Cairo, from the deck of one of Cook's steamers.

Aswan, Upper Egypt, January 19.

J. C. C.

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